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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,769	11/24/2003	Manoocher Birang	05542-516001 / 7901/CMP	4174
7590 05/12/2005			EXAMINER	
Patent Counsel Applied Materials, Inc. Legal Affairs Department P.O. Box 450A Santa Clara, CA 95052			NHU, DAVID	
			ART UNIT	PAPER NUMBER
			2818	
DATE MAILED: 05/12/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

**Office Action Summary**

Application No.

10/721,769

Applicant(s)

BIRANG ET AL.

Examiner

David Nhu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 March 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 19-21, 23 and 26-34 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12 and 24 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-9, 11-18, 22 and 35 is/are rejected.
- 7) ☒ Claim(s) 5 and 10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 60/428,569.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.



**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 01.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTIONS**

### ***Election/Restrictions***

1. *Applicant's election of Species I (Claims 1-18, 22, 24, 35) is acknowledge.*

Claims 1-18, 22, 24, 35 are remained for examination. Accordingly, claims 19-21, 23, 26-34 are canceled/withdrawn from consideration as being directed to a non-elected invention.

See 37 CFR 1.142(b) and MPEP § 821.03.

### **Drawings**

2. Applicant should submit new figures 1-7 by a computer drawing.

There is no subsequent wafers (354, 355, 356, 357) in figure 12.

Suggestion to figure 7, add information into the empty boxes of 323, 343, 303.

### **Claims Objection**

3. Claims 13-18 should be dependent of the claim 12.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

5. Claims 1-4, 6-9, 11, 13-18, 22, 35, are rejected under 35 U.S.C. 102(e) as being anticipated by Stanke et al (6,829,054 B2).

**Regarding claims 1, 35, Stanke, (see figures 1-4, 12, 13, col. 6, lines 49-67, col. 7, lines**

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1-67, col. 8, lines 1-36, col. 21, lines 8-58), teaches a method for closed loop control in chemical mechanical polishing (CMP) using an inline metrology station, comprising: measuring a dielectric/metal thickness (see col. 5, lines 36-47, col. 7, lines 37-50) in array of a first wafer 18a from a plurality of wafers 16 at a metrology station 10; determining at least one polishing from the dielectric/metal thickness in the array of the first wafer; and polishing a subsequent wafer 18b from the plurality of wafers 16 using the polishing parameter 14 (see figures 1, 2, 3).

**Regarding claim 22**, Stanke, (see figures 1-4, 12, 13, col. 6, lines 49-67, col. 7, lines 1-67, col. 8, lines 1-36, col. 21, lines 8-58), teaches measuring a first dielectric thickness in a first array of a first wafer at a metrology station 10 (see figures 1-3); measuring a second dielectric thickness in a second array of the first wafer at the metrology station 10 (see figures 1-3); passing the first and second dielectric thicknesses from the metrology station to a controller 10 (see figure 3); determining the controller at least one polishing parameter in the controller using the first and second dielectric thicknesses; and polishing a subsequent wafer with the at least one polishing parameter.

Regarding claims 2-4, 6-9, 11, Stanke (figures 1-15, col. 1-28) also, teaches measuring a dielectric thickness in a filed of the first wafer; determining the at least one polishing parameter includes using the dielectric thickness in the filed of the first wafer; determining a measurement of erosion, where the measurement of erosion is a difference between the dielectric thickness in the filed and the dielectric thickness in the array; wherein determining the at least one polishing parameter includes using the measurement of erosion; the dielectric thickness measurement to a controller; passing the polishing parameter to a CMP apparatus; measuring

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barrier layer residue thickness and determining the at least one polishing parameter from the dielectric thickness and the barrier layer residue thickness; the polishing parameter includes at least a polishing time; measuring with an acousto-optical metrology device; measuring the metal feature thickness includes measuring copper thickness.

**Allowable Subject Matter**

6. Claims 12, 24 are allowed.

The following is a statement of reason for the indication of allowance subject matter:

calculating at least one polishing parameter using the measurement of the metal feature thicknesses of the first wafer that approximates an optional solution under a plurality of constraints with reference to which a predicted metal feature thickness uniform is maximized in a subsequent wafer from the plurality of wafers, and a target metal feature thickness is minimized.

5. Claims 5, 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

determining a the at least one polishing parameter includes approximating an optional solution under a plurality of constraints with reference to which a predicted metal feature thickness uniform is maximized in a subsequent wafer from the plurality of wafers; determining the polishing parameter includes using the measurement of dielectric thickness in the array to approximate an optional solution under a plurality of constraints with reference to which a predicted copper feature thickness uniform is

maximized and a difference between a predicted copper feature thickness and a target copper feature thickness is minimized.

### **Conclusion**

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Wang'947, Pinson'145 are cited as of interest.
8. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned(see 710.02 (b)).
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Nhu (571)272-1792. The examiner can normally be reached on Monday-Friday from 7:30 AM to 5:00 PM. The examiner's supervisor, David Nelms can be reached on (571)272-1787.

*The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.*

*Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.*

*Information regarding the status of an application may be obtained from the patent application information retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR*

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Nhu



May 10, 2205

